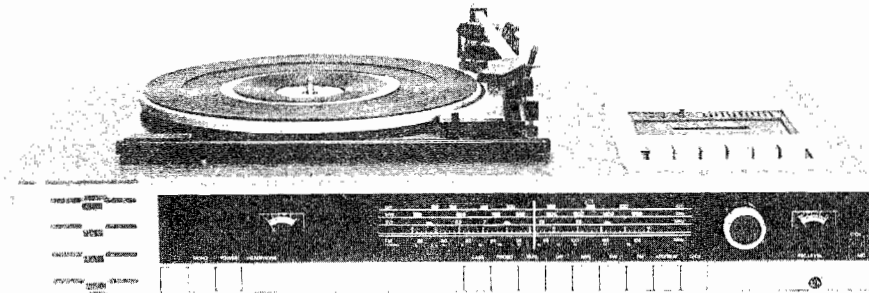


# LW-MW-SW-FM STEREO RECEIVER with STEREO CASSETTE RECORDER and TURN-TABLE



## SPECIFICATION

|                                 |  |                                  |   |
|---------------------------------|--|----------------------------------|---|
| General                         |  | Tuning Indicator                 | Peaking Meter for accurate tuning.                |
| Slider Controls                 | Balance, Volume, Bass, Treble,   | AM LW Coverage                   | 150 KHz - 330 KHz                                 |
|                                 |  | Sensitivity                      | 600 microvolt/meter                               |
| Rotary Controls                 | Tuning, Record level   | AM MW Coverage                   | 520 KHz - 1605 KHz                                |
| Push Buttons<br>(Left to Right) | St-Mono, ON-OFF, phono, Tape, LW, MW,<br>SW, FM AFC/BEAT, CrO <sub>2</sub>                         | Sensitivity                      | 400 microvolt/meter                               |
| Front Sockets                   | Headphones Jack, Stereo Microphone   | AM-SW Coverage                   | 6 MHz - 10 MHz<br>20 micorovolt                   |
| Rear Sockets<br>(Left to Right) | Aerials, AM(SW) FM to DIN Standard,<br>Tape, Speaker Left,<br>Speaker Right, Power, Fuse (500 MA). | AM-IF                            | 460 KHz   |
|                                 |  | Aerial LW- MW                    | Ferrite Rod                                       |
|                                 |  | Aerial SW                        | External Terminal                                 |
| Consumption                     | 130 Watts max.   | Tape Mechanism System            | Cassette, 4 Track, 2 channel horizontal<br>POP-UP |
| Amplifier.                      |  |                                  |   |
| Semi-Conductors                 | 45 transistors, 1 integrated circuit 18<br>diodes.   | Wow Flutter                      | 0.15 %  |
|                                 |  | Speed                            | 4.75 cm/SEC                                       |
| Power Output                    | 15 watts per channel @ 1% THD.   | Frequency Response               | 40 Hz 10,000 Hz $\pm$ 6 dB                        |
| Output Impedance                | 8 ohms per channel   | Cross Talk                       | 35 dB   |
| Frequency Response              | 15 Hz-20 KHz $\pm$ 3 dB  | S/N Ratio                        | 50 dB   |
| Treble Control Range            | @ 14 KHz = + 10 dB to - 7 dB   | Tape Counter                     | Digital   |
| Bass Control Range              | @ 60 Hz = + 10 dB to - 10dB  | Tape Bias and Erase<br>Frequency | 80 KHz  |
| Gram input sens.                | @ 1 KHz = 5 mv for Rated Output  |                                  |   |
| Tape input sens.                | @ 1 KHz = 300 mv for Rated Output  | CrO <sub>2</sub> Tape            | switch to Chromdioxid performance.                |
| Signal to Noise Ratio           | Better than - 45 dB  | Level Control                    | Stereo Recording with level meter.                |
| Power Supply                    | 220 Volt AC 50 Hz. (240 volt. 50Hz)  |                                  |   |
| Tuner                           |  |                                  |   |
| FM. Coverage                    | 88 MHz - 104 MHz   |                                  |   |
| FM. IF.                         | 10.7 MHz   |                                  |   |
| FM. Aerial Impedance            | 300 ohms   |                                  |   |
| FM. Sensitivity                 | For S/N 30 dB = 5 microvolt.   |                                  |   |
| FM. Sensitivity                 | For 30 dB limiting = 28 microvolt.   |                                  |   |
| Multiplex (Seperation)          | 30 dB  |                                  |   |

NOTE: Due to the possibility of modifications from time to time, the right is reserved to supply goods which may differ slightly from those illustrated and described.

## TUNER, IF & MULTIPLEX CIRCUIT BOARD



TOP VIEW

BOTTOM VIEW

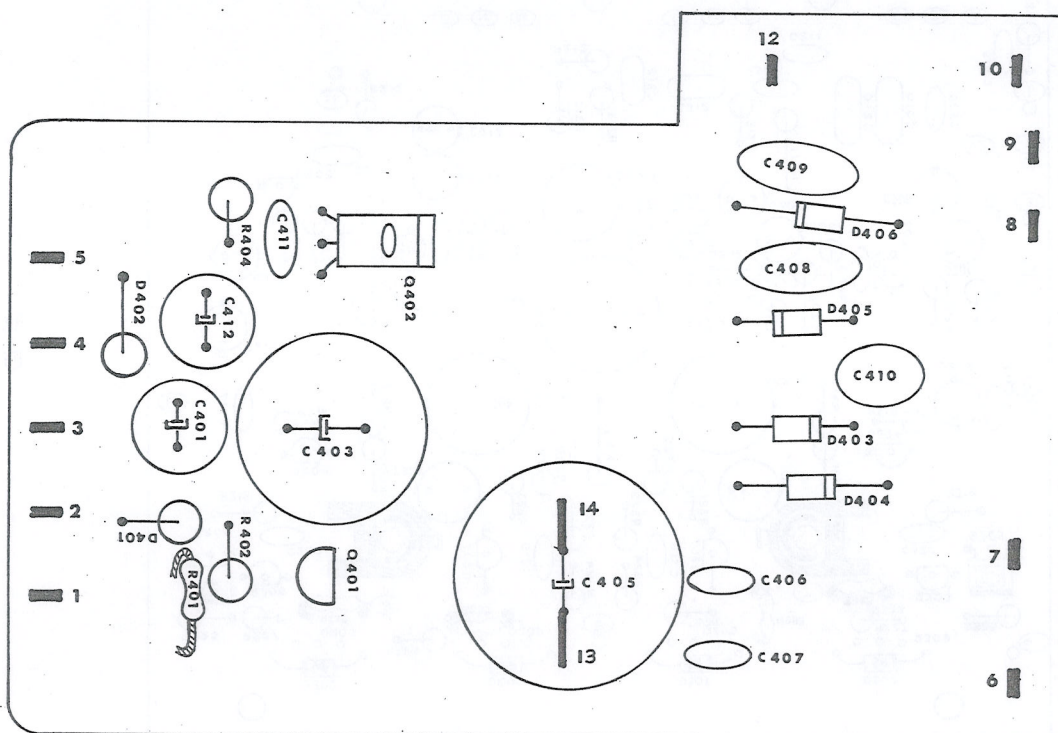


[illegible]

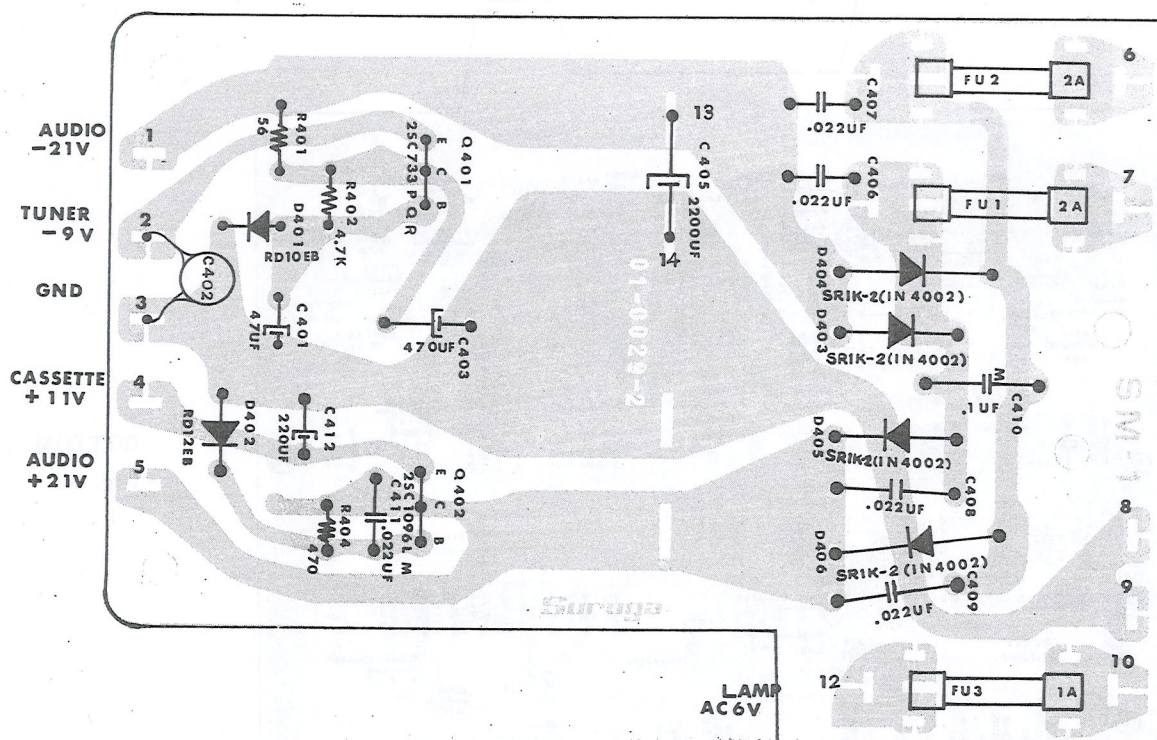
BOTTOM VIEW  
Fig. 4



# POWER CIRCUIT BOARD



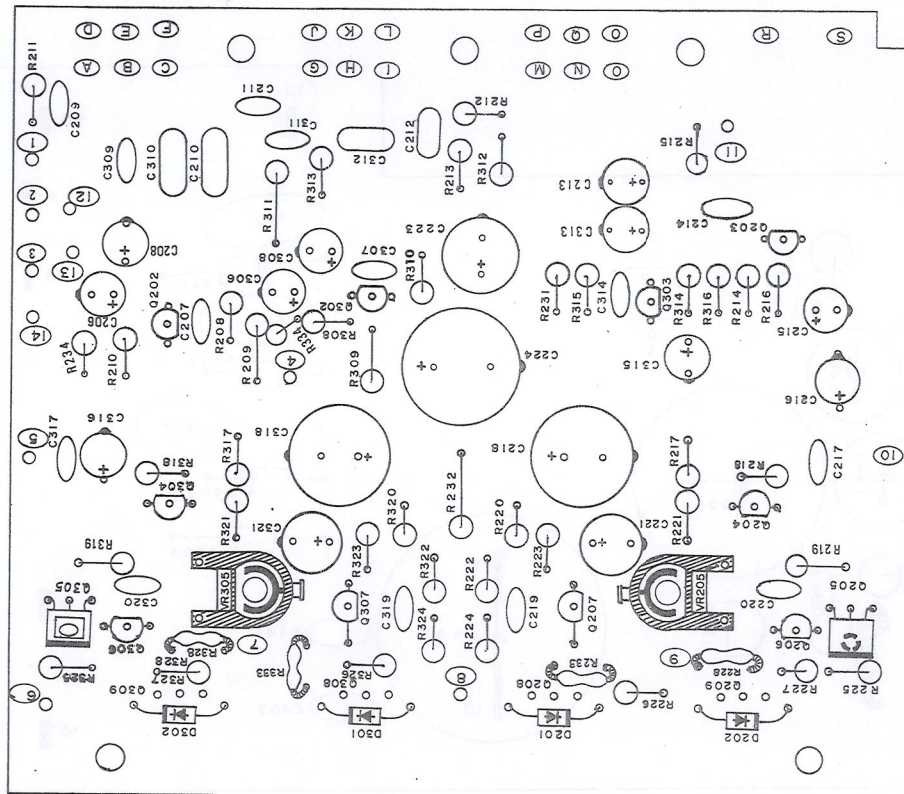
TOP VIEW  
Fig. 5



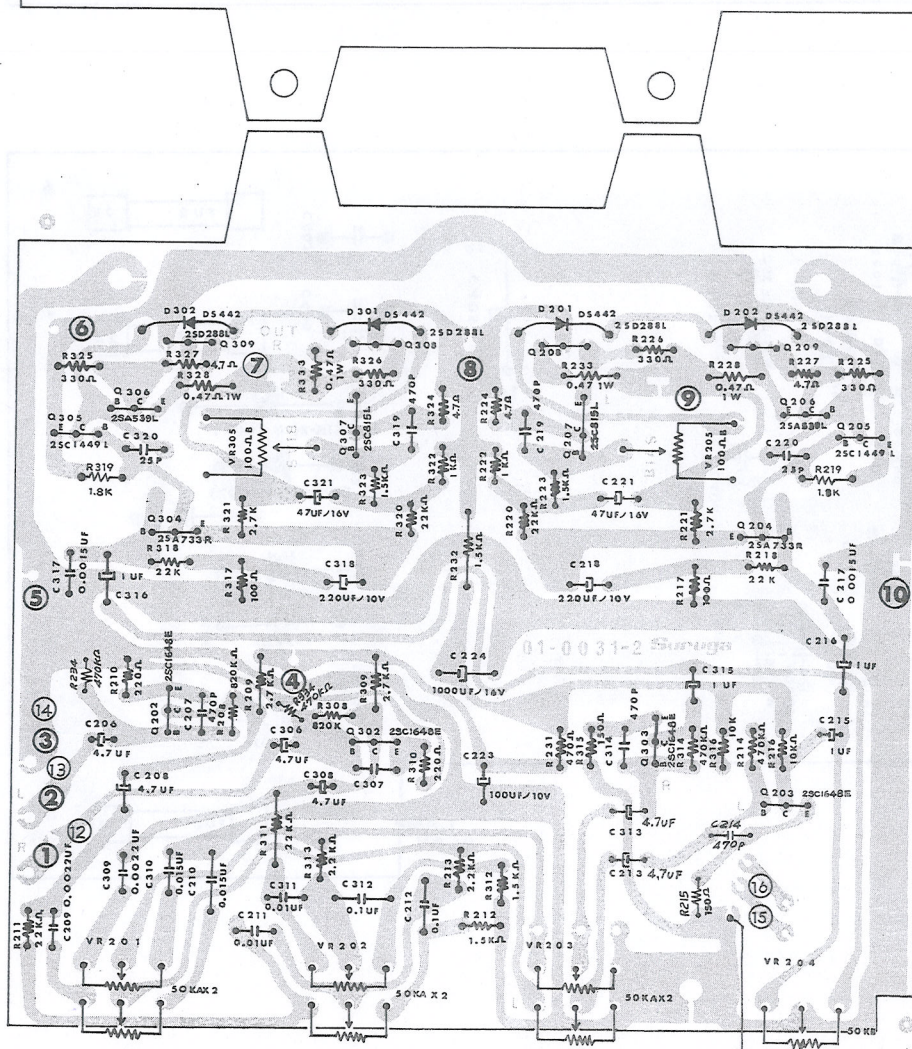
BOTTOM VIEW  
Fig. 6



# AUDIO CIRCUIT BOARD



TOP VIEW  
Fig. 7



BOTTOM VIEW  
Fig. 8



6

# WIRING DIAGRAM (TOP VIEW) 220Volt

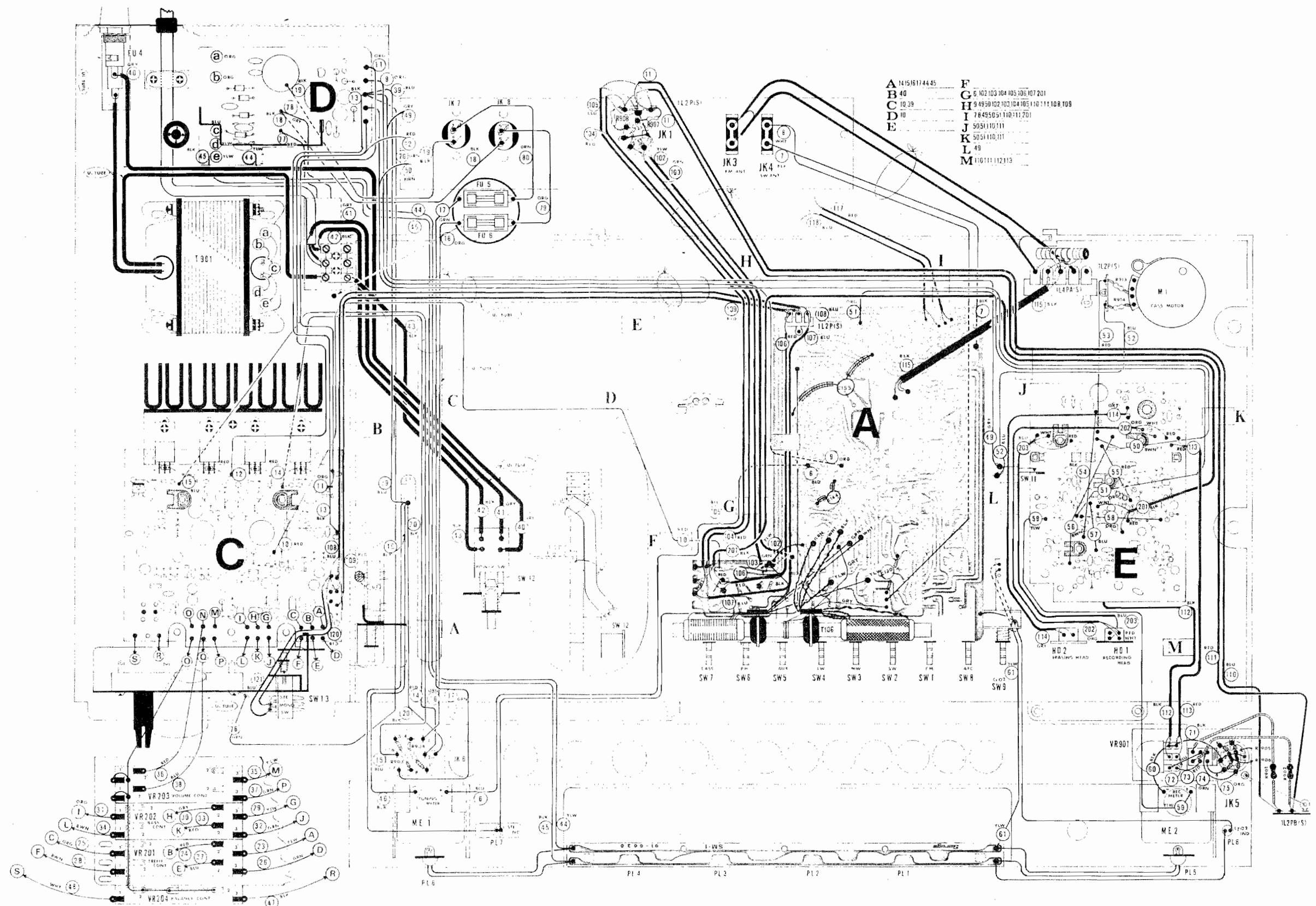


Fig. 10



### WIRING DIAGRAM (TOP VIEW) 240 Volt.

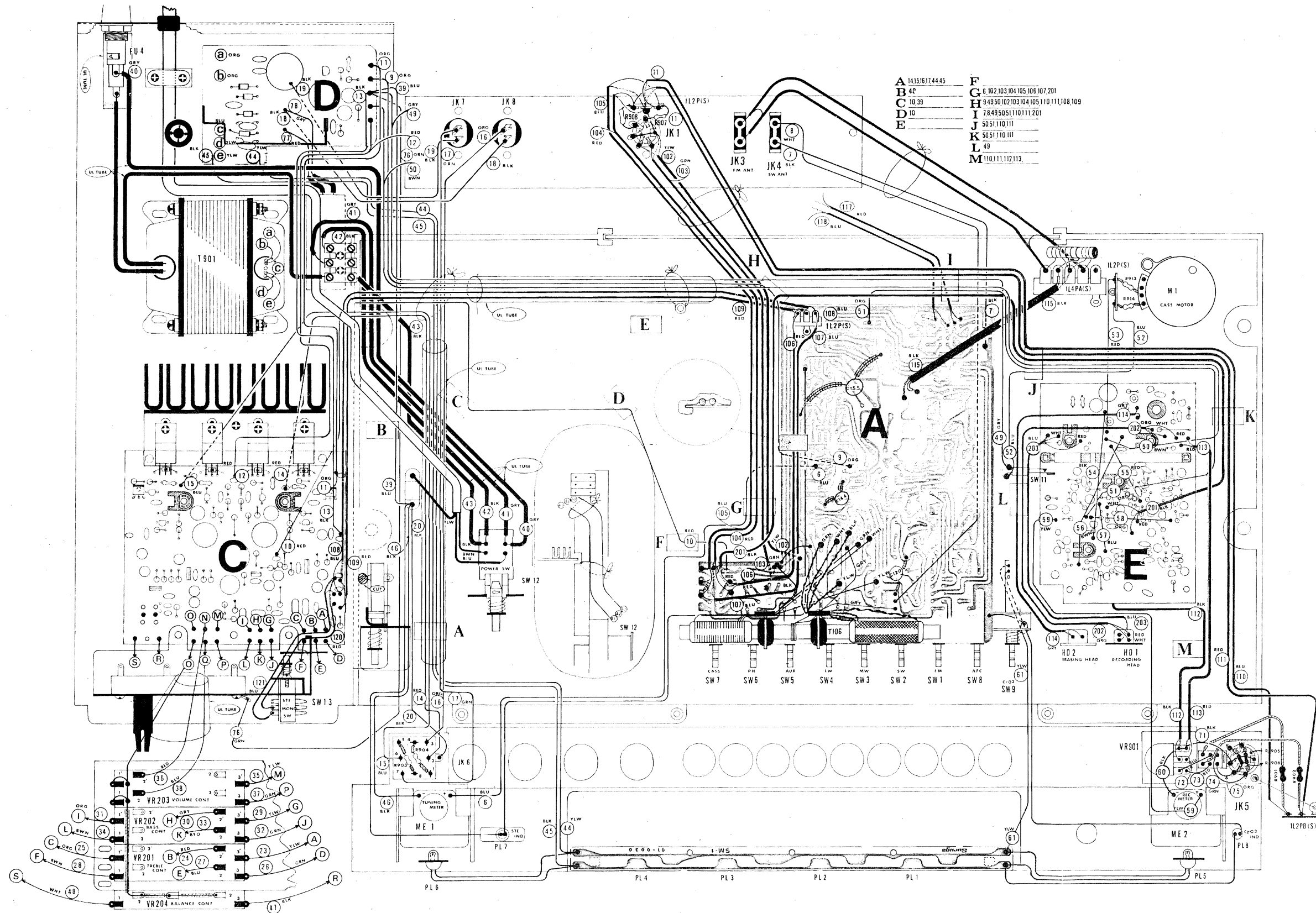


Fig. 11

# CIRCUIT SCHEMATIC DIAGRAM (220Volt)

## CIRCUIT DIAGRAM

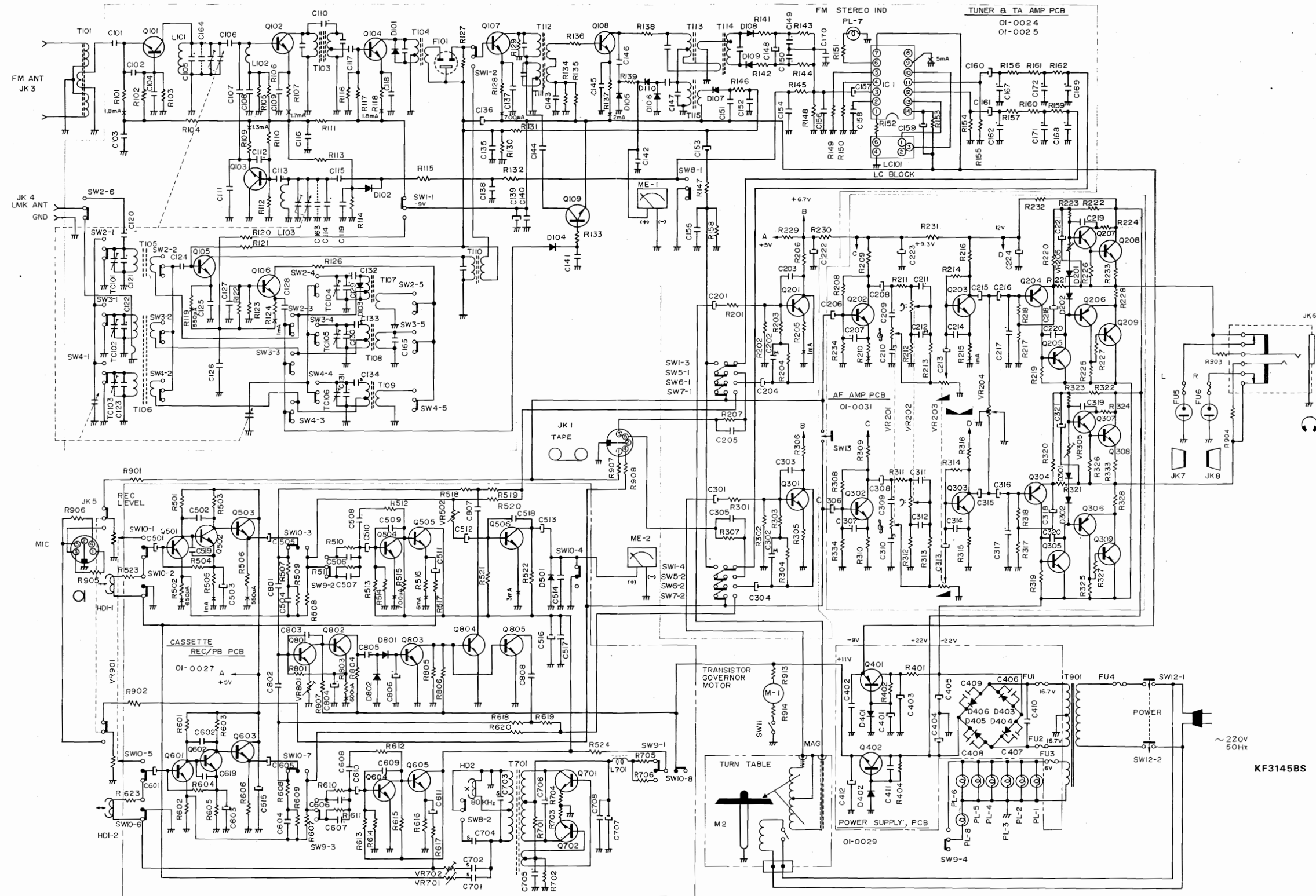


Fig. 12



CIRCUIT DIAGRAM

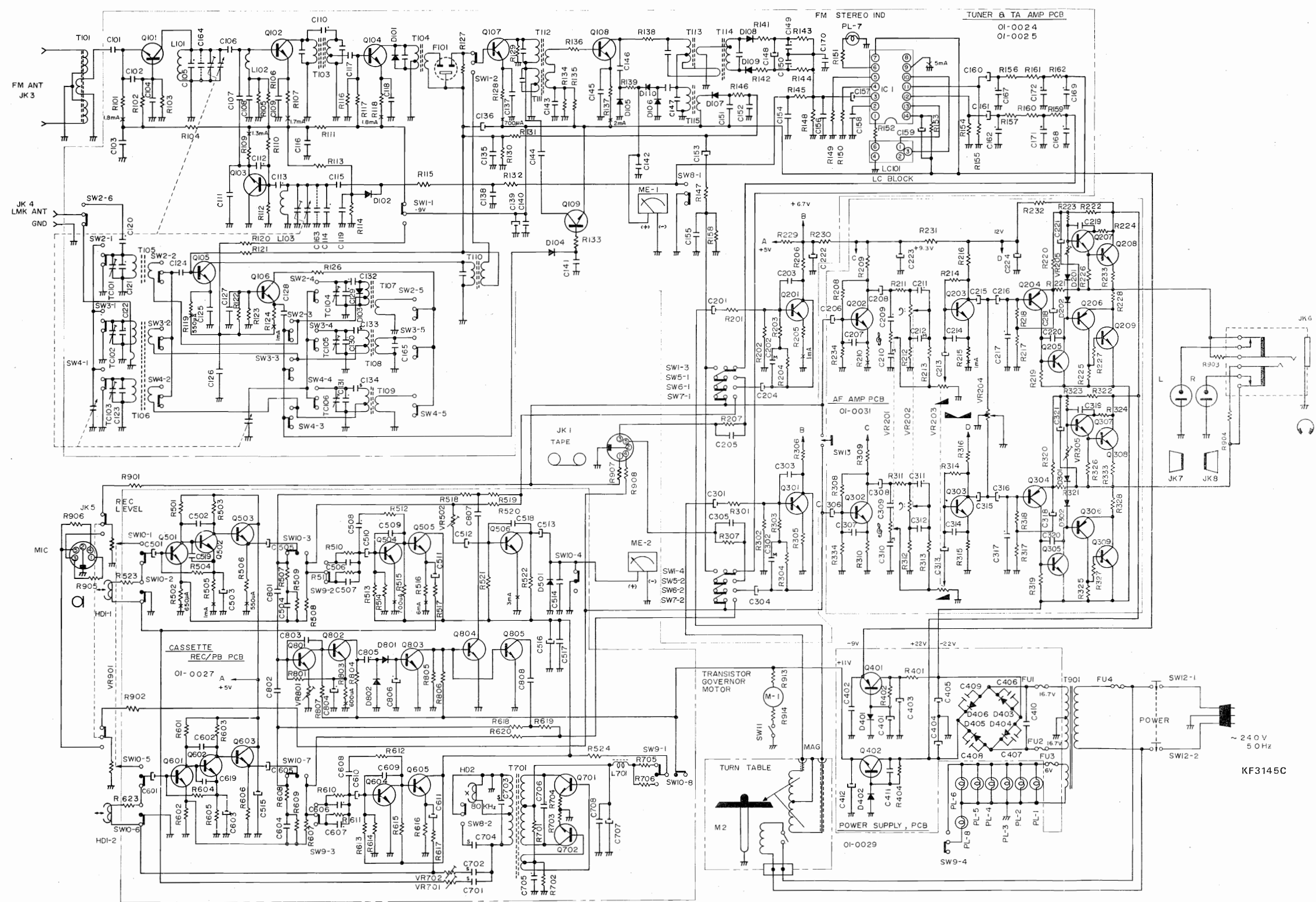


Fig. 13

EXPLODED VIEW FOR CASSETTE MECHANISM

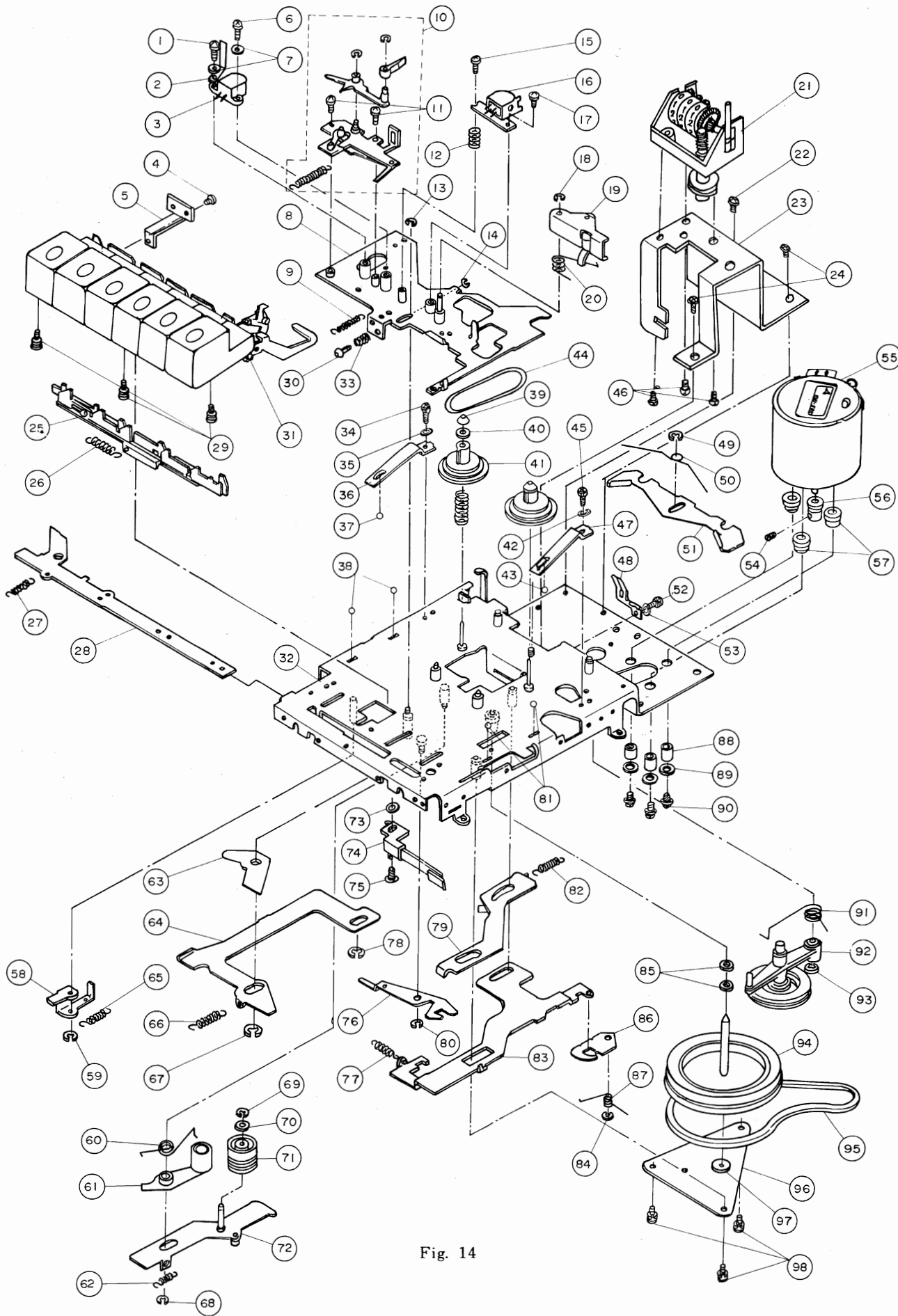


Fig. 14

MECHANICAL PARTS LIST(CASSETTE DECK)

| NO. | PARTS NO. | DESCRIPTION   | NO. | PARTS NO. | DESCRIPTION   |
|-----|-----------|---|-----|-----------|---|
| 1   | Z4-2365   | Screw, $\oplus$ pan head M2 $\times$ 6                          | 50  | T4-5060   | Brake lever spring  |
| 2   | T4-6356   | Wire holder   | 51  | T4-6003   | Brake lever   |
| 3   | T4-8001   | ERASE Head T8004  | 52  | Z4-2366   | Screw, pan head M2.6 $\times$ 4                                 |
| 4   | Z4-5032   | Screw, $\oplus$ pan head M2 $\times$ 3                          | 53  | Z4-3304   | Spring washer 2.6S  |
| 5   | T4-10215  | Spring holder   | 54  | Z4-2372   | Screw, plate M2 $\times$ 3                                      |
| 6   | Z4-5539   | Screw, $\oplus$ lock type M2 $\times$ 6                         | 55  | T4-7515   | Motor MH1-5R9B  |
| 7   | Z4-5132   | Washer, flat 2 $\phi$ $\times$ 0.4                              | 56  | T4-7074   | Motor pulley 2 $\phi$ # 2200                                    |
| 8   | TA3-998   | Head base ass'y   | 57  | T4-10688  | Motor cushion rubber  |
| 9   | T4-7821   | Head base spring B.   | 58  | T4-9314   | REW. lever  |
| 10  | TA2-1027  | ASO mechanism ass'y   | 59  | Z4-1414   | Snap ring 2.5 $\phi$ $\times$ 0.4                               |
| 11  | Z4-5077   | Screw, $\oplus$ SEMS (w/spring washer) pan head M2 $\times$ 5   | 60  | T4-7853   | Idler B lever spring  |
| 12  | T4-5067   | Head adjusting spring   | 61  | TA4-9511  | Idler B ass'y   |
| 13  | Z4-1413   | Snap ring 2 $\phi$ $\times$ 0.4                                 | 62  | T4-10401  | REW. lever spring B   |
| 14  | Z4-1413   | Snap ring 2 $\phi$ $\times$ 0.4                                 | 63  | T4-7013   | Timing safety lever   |
| 15  | Z4-5551   | Screw, $\oplus$ lock type M2 $\times$ 5                         | 64  | T3-702    | Brake plate operation lever                                     |
| 16  | T3-8031   | REC./PLAY Head WY-438ZT   | 65  | T4-7846   | FR. lever spring D  |
| 17  | Z4-5077   | Screw, $\oplus$ SEMS (w/spring washer) pan head M2 $\times$ 5   | 66  | T4-7077   | Brake slider operation lever spring                             |
| 18  | Z4-1413   | Snap ring 2 $\phi$ $\times$ 0.4                                 | 67  | Z4-1412   | Snap ring 4 $\phi$ $\times$ 0.6                                 |
| 19  | TA4-10335 | Pinch roller arm ass'y  | 68  | Z4-1414   | Snap ring 2.5 $\phi$ $\times$ 0.4                               |
| 20  | T4-10359  | Pinch roller spring   | 69  | Z4-1413   | Snap ring 2 $\phi$ $\times$ 0.4                                 |
| 21  | T3-810    | Tape counter  | 70  | Z4-5137   | Washer, flat type 2.5 $\phi$ $\times$ 0.1                       |
| 22  | Z4-5062   | Screw, $\oplus$ SEMS (w/spring washer) pan head M2.6 $\times$ 5 | 71  | TA3-985   | Idler A ass'y   |
| 23  | T4-10342  | Counter mounting plate  | 72  | TA4-9049  | FR. lever ass'y   |
| 24  | Z4-5064   | Screw, $\oplus$ SEMS (w/spring washer) pan head M3 $\times$ 6   | 73  | Z4-5108   | Washer, flat type 3.1 $\phi$ $\times$ 0.5                       |
| 25  | TA4-10323 | Push button mechanism ass'y                                     | 74  | T4-7563   | Motor switch BSW-46B  |
| 26  | T4-10348  | Push button cam plate spring                                    | 75  | Z4-5061   | Screw, $\oplus$ SEMS (w/spring washer) pan head M2.6 $\times$ 4 |
| 27  | T4-5100   | REC. lever spring   | 76  | T4-10586  | FF. lever   |
| 28  | T4-10278  | REC. lever A-1  | 77  | T4-10360  | Pause operation lever spring                                    |
| 29  | Z4-5061   | Screw, $\oplus$ SEMS (w/spring washer) pan head M2.6 $\times$ 4 | 78  | Z4-1414   | Snap ring 2.5 $\phi$ $\times$ 0.4                               |
| 30  | T4-10436  | Head base shaft   | 79  | TA4-7063  | FF. operation lever ass'y                                       |
| 31  | TA2-1085  | Push button block ass'y TM-229                                  | 80  | Z4-1414   | Snap ring 2.5 $\phi$ $\times$ 0.4                               |
| 32  | TA2-1084  | Parts mounting frame ass'y                                      | 81  | Z4-6304   | Steel ball 2 $\phi$   |
| 33  | T4-1395   | Head base shaft spring  | 82  | T4-7079   | FF. operation lever spring                                      |
| 34  | Z4-2366   | Screw, $\oplus$ pan head M2.6 $\times$ 4                        | 83  | TA4-10458 | Pause operation lever ass'y                                     |
| 35  | Z4-3304   | Spring washer 2.6S  | 84  | Z4-1414   | Snap ring 2.5 $\phi$ $\times$ 0.4                               |
| 36  | T4-7016   | Head slider pressure spring                                     | 85  | Z4-5128   | Washer, polyethylene 2.5 $\phi$ $\times$ 0.25                   |
| 37  | Z4-5202   | Steel ball 2.5 $\phi$   | 86  | T4-10218  | Pause lock plate  |
| 38  | Z4-6304   | Steel ball 2 $\phi$   | 87  | T4-7687   | Pause lock plate spring   |
| 39  | T4-9512   | Reel shaft cap  | 88  | T4-7072   | Motor mounting parts  |
| 40  | Z4-5141   | Washer, polyethylene 1.6 $\phi$ $\times$ 6 $\phi$ $\times$ 0.25 | 89  | Z4-5111   | Washer, flat type 2 $\phi$ $\times$ 0.4                         |
| 41  | TA4-7102  | Reel base B ass'y   | 90  | Z4-5069   | Screw, $\oplus$ SEMS plate M2.6 $\times$ 7                      |
| 42  | Z4-3304   | Spring washer 2.6S  | 91  | T4-7081   | Tension arm spring  |
| 43  | Z4-5202   | Steel ball 2.5 $\phi$   | 92  | TA4-7062  | Tension arm ass'y   |
| 44  | T4-10341  | Counter belt 1 $\square$ $\times$ 41.7 $\phi$                   | 93  | Z4-1414   | Snap ring 2.5 $\phi$ $\times$ 0.4                               |
| 45  | Z4-2366   | Screw, pan head M2.6 $\times$ 4                                 | 94  | TA4-1958  | Flywheel ass'y  |
| 46  | Z4-5064   | Screw, $\oplus$ SEMS (w/spring washer) pan head M3 $\times$ 6   | 95  | T4-7070   | Main belt 1.2 $\square$ $\times$ 78.3 $\phi$                    |
| 47  | T4-7016   | Head slider pressure spring                                     | 96  | T4-7868   | Flywheel holder plate   |
| 48  | T4-10497  | Cassette pressure spring  | 97  | T4-7869   | Flywheel adjust screw   |
| 49  | Z4-1414   | Snap ring 2.5 $\phi$ $\times$ 0.4                               | 98  | Z4-5063   | Screw, $\oplus$ SEMS (w/spring washer) pan head M2.6 $\times$ 6 |



## TROUBLE SHOOTING CHART

| <u>SYMPTOM</u>       | <u>CAUSE</u>  | <u>REMEDY</u>  |
|----------------------|---|--|
|                      | (2) In case of faulty recording                             |  |
|                      | 1. Insufficient bias.                                       | 1. Adjust VR-701 and VR-702                            |
|                      | 2. Excessive recording level.                               | 2. Check with recording circuit.                       |
|                      | 3. Poor tape.   | 3. Try new tape.                                       |
| Imperfect erasing    | 1. Dirty erase head or cassette tape.                       | 1. Clean by soft cloth with alchohol, or try new tape. |
|                      | 2. Faulty erase head or disconnection of lead wires.        | 2. Solder disconnected wire or replace faulty head.    |
|                      | 3. Faulty OSC circuit.                                      | 3. Check and replace OSC. circuit parts.               |
| VU meter Inoperative | 1. Faulty SW 10-4   | 1. Replace SW-10-4 if necessary.                       |
|                      | 2. Faulty VU meter.   | 2. Replace meter.                                      |
|                      | 3. Disconnection or short circuit of lead wires from meter. | 3. Solder or replace wires.                            |
|                      | 4. Faulty VU meter AMP circuit parts.                       | 4. Replace meter AMP circuit parts.                    |
| Insufficient Volume  | 1. Dirty R/P head of cassette tape.                         | 1. Clean by soft cloth with alchohol, or try new tape. |
|                      | 2. Faulty amplifier.  | 2. Check and replace parts.                            |
|                      | 3. Improper angle of R/P head.                              | 3. Adjust angle.                                       |
|                      | 4. Insufficient sensitivity of R/P head.                    | 4. Replace head.                                       |
| Noise                | (1) Noise is heard while motor stops.                       |  |
|                      | 1. Faulty parts (Transistor. Resistor etc.) on amplifier.   | 1. Replace faulty parts.                               |
|                      | 2. Faulty Rec/Play select switch.                           | 2. Replace switch.                                     |
|                      | (2) Noise is heard when tape is being playback.             |  |
|                      | 1. Faulty motor.  | 1. Replace motor.                                      |
|                      | (3) Noise is heard when recording.                          |  |
|                      | 1. Magnetized head.   | 1. Take magnetism off with eraser.                     |
|                      | 2. Faulty motor.  | 2. Replace motor.                                      |

### DIAL CORD STRINGING

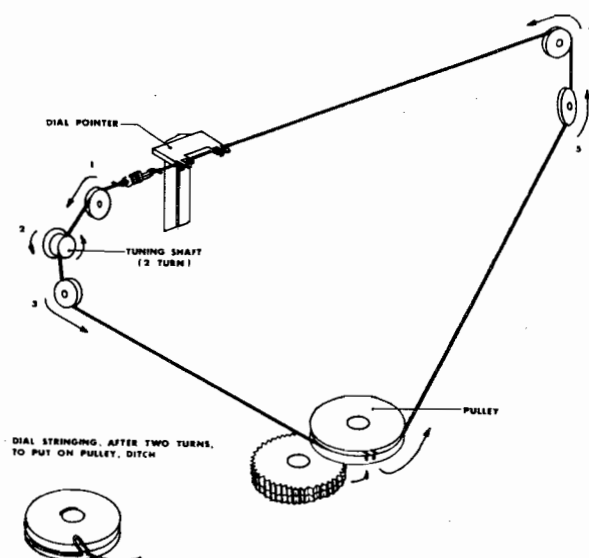


Fig. 15

## TROUBLE SHOOTING CHART

| <u>SYMPTOM</u>                | <u>CAUSE</u>  | <u>REMEDY</u>   |
|-------------------------------|---|---|
| Inoperative                   | <ol style="list-style-type: none"> <li>1. AC Plug not inserted properly.</li> <li>2. Faulty motor switch.</li> <li>3. Defective remote control jack.</li> <li>4. Defective remote control switch inside microphone.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Insert AC plug properly.</li> <li>2. Adjust motor switch. (SW11)</li> <li>3. Adjust or replace jack if necessary.</li> <li>4. Replace microphone.</li> </ol>  |
| No Fast Forward               | <ol style="list-style-type: none"> <li>1. F.F. pulley slippage.</li> <li>2. Defective F.F. pulley.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Clean by soft cloth with alchohol.</li> <li>2. Replace F.F. pulley.</li> </ol>  |
| No Rewind                     | <ol style="list-style-type: none"> <li>1. Rew. roller slippage.</li> <li>2. Defective Rewind. roller.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Clean by soft cloth with alchohol.</li> <li>2. Replace Rewind. roller.</li> </ol>   |
| No Playback                   | <ol style="list-style-type: none"> <li>1. Motor pulley slips against flywheel.</li> <li>2. Pinch roller slippage.</li> <li>3. Reel frange slips against take-up pulley.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Clean by soft cloth with alchohol.</li> <li>2. Clean by soft cloth with alchohol.</li> <li>3. Clean by soft cloth with alchohol.</li> </ol>   |
| Excessive wow and flutter     | <ol style="list-style-type: none"> <li>1. Faulty flywheel.</li> <li>2. Faulty reel frange rubber.</li> <li>3. Reel frange rubber slippage.</li> <li>4. Capstan slippage.</li> <li>5. Dirty pinch roller.</li> <li>6. Dirty drive belt.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Replace flywheel.</li> <li>2. Replace reel frange</li> <li>3. Clean by soft cloth with alchohol.</li> <li>4. Clean by soft cloth alchohol.</li> <li>5. Clean by soft cloth with alchohol.</li> <li>6. Clean by soft cloth with alchohol.</li> </ol> |
| Audio Inoperative             | <ol style="list-style-type: none"> <li>1. Faulty slide switch.</li> <li>2. Faulty amplifier.</li> <li>3. Disconnect speaker lead wire or voice coil.</li> <li>4. Faulty headphone jack.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Replace slide switch.</li> <li>2. Check and replace faulty parts.</li> <li>3. Solder disconnected parts or replace speaker.</li> <li>4. Replace headphone jack.</li> </ol>  |
| Faint or Distorted Audio      | <ol style="list-style-type: none"> <li>1. Faulty amplifier.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check and replace faulty parts.</li> </ol>  |
| Does not record, reproduce OK | <ol style="list-style-type: none"> <li>1. Defective microphone.</li> <li>2. Faulty OSC circuit.</li> <li>3. Faulty slide switch.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Replace microphone.</li> <li>2. Check OSC. circuit.</li> <li>3. Replace slide switch.</li> </ol>  |
| Poor Tone Quality .....       | <p>Note: Check if recording caused poor tone quality by playing back pre-recorded tape.</p> <p>(1) In case of faulty playback:</p> <ol style="list-style-type: none"> <li>1. Dirty R/P head or cassette tape.</li> <li>2. Defaced R/P head.</li> <li>3. Improper angle of R/P head.</li> <li>4. Faulty parts on amplifier.</li> </ol> |   |
|                               |   | <ol style="list-style-type: none"> <li>1. Clean by soft cloth with alchohol. or try new tape.</li> <li>2. Replace head.</li> <li>3. Adjust anale.</li> <li>4. Replace faulty parts.</li> </ol>  |



## MECHANICAL ADJUSTMENTS

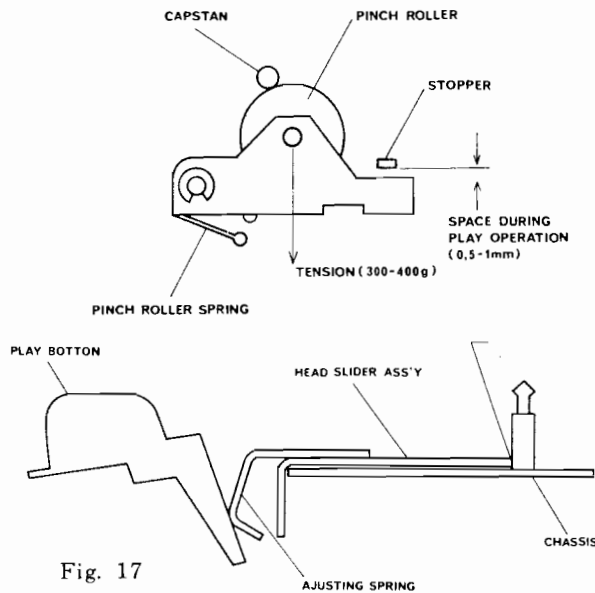


Fig. 16

1. Refer to Fig. 16 for adjustment of Pinch Roller tension when in the Play position.

2. Adjust the Head Slider (Head Base) to be as per in Fig.17 during Forward operation.

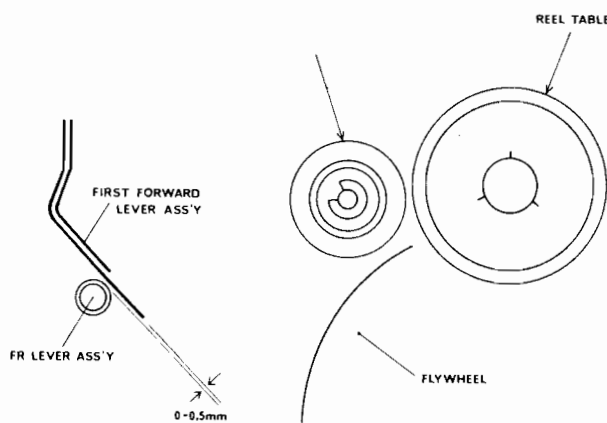


Fig. 18

3. Adjust as shown(A) in Fig. 18 with the cassette button at Stop position. If the torque cannot be adjusted to 70-130 gcm then replace limmitter (B).

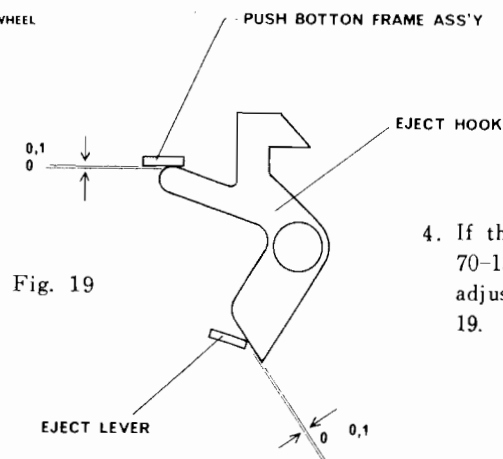


Fig. 19

4. If the torque cannot be adjusted to 70-130gcm during Rewind operation, adjust the spring as shown in Fig. 19.

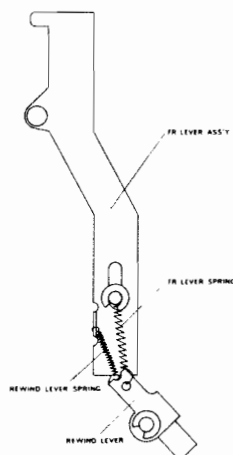


Fig. 20

- 5 If cassette door does not open properly at eject position, adjust the part as shown in Fig.20.

## ALIGNMENT OF CASSETTE TAPE AMPLIFIER

### 1. Tape Speed:

Reproduce test tape, MTT-111 (3KHz) and check if speed deviation be within  $\pm 2.5\%$ . If not, adjust semi-fixed resistor used for speed adjustment inside cassette motor.

### 2. Head Azimuth:

Reproduce test tape, MTT-113B (8KHz), and adjust azimuth alignment screw

1) to obtain maximum output level and 2) to read both L & R level within 3dB.

### 3. Recording Signal Level:

a) Stop oscillation of the receiver by cutting power supply to cassette OSC circuit of the set or shorting two terminals of erase head.

b) Add 1000 Hz Recording Signal:

For finished units, add the signal to TB (tape input); for semi-finished ones, add the signal to terminals No. 4 & No. 9 of E PCB (cassette PCB).

Then adjust the input so as to be reading of No. 3 & No. 8 terminals 0.28mV/10 ohm (28.1uA).

c) Adjust VR502 so that pointer of the receiver level meter to show 0 UV.

### 4. Recording Bias:

With an operation of OSC circuit, set CrO<sub>2</sub> "ON" position. Apply potential meter onto No. 4 & No. 8 terminals of E PCB, and adjust the voltage by rotating VR701 & VR702 to read 6mV/10 ohm (600uA). Record on MTT-505 (chrome tape) the signal with level below -10dB from 0 UV. Reproduce the signal and check if the signal at 8000 Hz to be within -6dB against 0dB at 1000 Hz.

If the signal be over -6dB, re-adjust so that signal to be within -6dB by reducing bias current. Be sure that record & play distortion at 0 UV should not be less than 5% by this adjustment.

### 5. Adjustment of an operation of noise reduction circuit.

5-1

a) Reproduce MTT-112 (0dB at 333Hz).

b) Speaker output level to be adjusted to 500mW.

c) Add 10KHz signal onto both terminals of recording & playback heads.

d) Adjust the level (10KHz signal) to read below -45dB from the speaker output level of MT-112, and then adjust by VR801 to the point where output signal wave shows sudden increase.

5-2 Or, reproduce noise of blank tape of MTT-505. Observing its noise by oscilloscope, and adjust VR801 to the point where the noise at high-end is just about to increase.

## ALIGNMENT OF POWER AMPLIFIER CIRCUIT

### Adjustment of Base Bias of output transistor

Add 10KHz signal of which output voltage can obtain 10W/4 ohm to TB (tape input) terminal, and observe its wave (of 10W/4 ohm) by wide-band oscilloscope.

Adjust VR205 & VR305 to the point where overcross distortion begins to disappear. Be sure that the output level of residual hum should be less than 3mV during this adjustment.

## ELECTRICAL &amp; MECHANICAL PARTS LIST

## ELECTRICAL PARTS LIST

| SYMBOL NO.  | DESCRIPTION                      | SYMBOL NO. | DESCRIPTION                 | SYMBOL NO. | DESCRIPTION                 |
|---|----------------------------------|------------|-----------------------------|------------|-----------------------------|
| Q 101, 102, 105   | Transistor 2SC839H               | R 157      | " " 2.7K $\Omega$           | R 505      | Resistor 1/4W 4.7K $\Omega$ |
| Q 103, 108  | " 2SC839F                        | R 158      | " " 27K $\Omega$            | R 506      | " " 3.9K $\Omega$           |
| Q 104   | " 2SC839F.H                      | R 159      | Resistor 1/4W 22K $\Omega$  | R 507      | " " 15K $\Omega$            |
| Q 104, 105  | " 2SC945P                        | R 160      | " " 22K $\Omega$            | R 508      | " " 10K $\Omega$            |
| Q 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156   | " 2SC945P.Q                      | R 161      | " " 22K $\Omega$            | R 509      | " " 120K $\Omega$           |
| Q 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156  | " 2SC945P.Q.R                    | R 162      | " " 22K $\Omega$            | R 510      | " " 10K $\Omega$            |
| Q 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156  | " 2SC815L                        | R 201      | Resistor 1/4W 3.3K $\Omega$ | R 511      | " " 10K $\Omega$            |
| Q 402   | " 2SC1096L.M                     | R 202      | " " 220K $\Omega$           | R 512      | " " 100K $\Omega$           |
| Q 205, 305  | " 2SC1449L.M                     | R 203      | " " 18K $\Omega$            | R 513      | " " 820K $\Omega$           |
| Q 205, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000  | " 2SC1648F                       | R 204      | " " 560K $\Omega$           | R 514      | " " 68K $\Omega$            |
| Q 201, 301  | " 2SC1648ES                      | R 205      | " " 100 $\Omega$            | R 515      | " " 5.6K $\Omega$           |
| Q 206, 306  | " 2SA539L                        | R 206      | " " 33K $\Omega$            | R 516      | " " 1K $\Omega$             |
| Q 204, 304  | " 2SA733R                        | R 207      | " " 470K $\Omega$           | R 517      | " " 10K $\Omega$            |
| Q 401   | " 2SA733P.Q.R                    | R 208      | " " 820K $\Omega$           | R 518      | " " 2.7K $\Omega$           |
| Q 308, 309  | " 2SD288L                        | R 209      | " " 2.7K $\Omega$           | R 519      | " " 2.7K $\Omega$           |
| IC 1  | Integrated circuit $\mu$ PC554C  | R 210      | " " 220 $\Omega$            | R 520      | " " 820K $\Omega$           |
| D 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000 | " 1S188AM                        | R 211      | " " 22K $\Omega$            | R 521      | " " 820K $\Omega$           |
| D 401   | Zener Diode RD10EB               | R 212      | " " 1.5K $\Omega$           | R 522      | " " 2.2K $\Omega$           |
| D 402   | " RD12EB                         | R 213      | " " 2.2K $\Omega$           | R 523      | " " 10 $\Omega$             |
| D 403   | Silicon Varistor DS442           | R 214      | " " 470K $\Omega$           | R 524      | " " 18 $\Omega$             |
| D 404   | Rectifying Diode 1N4002 or SR1K2 | R 215      | " " 150 $\Omega$            | R 601      | Resistor 1/4W 56K $\Omega$  |
| R 101   | Resistor 1/4W 560 $\Omega$       | R 216      | " " 10K $\Omega$            | R 602      | " " 180 $\Omega$            |
| R 102   | " 5.6K $\Omega$                  | R 217      | " " 100 $\Omega$            | R 603      | " " 18K $\Omega$            |
| R 103   | " 18K $\Omega$                   | R 218      | " " 22K $\Omega$            | R 604      | " " 150K $\Omega$           |
| R 104   | " 47 $\Omega$                    | R 219      | " " 4.7K $\Omega$           | R 605      | " " 4.7K $\Omega$           |
| R 105   | " 10K $\Omega$                   | R 220      | " " 22K $\Omega$            | R 606      | " " 3.9K $\Omega$           |
| R 106   | " 4.7K $\Omega$                  | R 221      | " " 2.7K $\Omega$           | R 607      | " " 10K $\Omega$            |
| R 107   | " 1K $\Omega$                    | R 222      | " " 1K $\Omega$             | R 608      | " " 15K $\Omega$            |
| R 109   | " 1.8K $\Omega$                  | R 223      | " " 1.5K $\Omega$           | R 609      | " " 120K $\Omega$           |
| R 110   | " 10K $\Omega$                   | R 224      | " " 4.7 $\Omega$            | R 610      | " " 10K $\Omega$            |
| R 111   | " 100 $\Omega$                   | R 225      | " " 330 $\Omega$            | R 611      | " " 10K $\Omega$            |
| R 112   | " 27K $\Omega$                   | R 226      | " " 330 $\Omega$            | R 612      | " " 100K $\Omega$           |
| R 113   | " 82K $\Omega$                   | R 227      | " " 4.7 $\Omega$            | R 613      | " " 820K $\Omega$           |
| R 114   | " 1.5K $\Omega$                  | R 228      | " " 1W 0.47 $\Omega$        | R 614      | " " 68K $\Omega$            |
| R 115   | " 100K $\Omega$                  | R 229      | " " 1/4W 1K $\Omega$        | R 615      | " " 5.6K $\Omega$           |
| R 116   | " 10K $\Omega$                   | R 230      | " " 1.5K $\Omega$           | R 616      | " " 1K $\Omega$             |
| R 117   | " 4.7K $\Omega$                  | R 231      | " " 470 $\Omega$            | R 617      | " " 10K $\Omega$            |
| R 118   | " 1K $\Omega$                    | R 232      | " " 1.5K $\Omega$           | R 618      | " " 2.7K $\Omega$           |
| R 119   | " 1K $\Omega$                    | R 233      | " " 1W 0.47 $\Omega$        | R 619      | " " 2.7K $\Omega$           |
| R 120   | " 100 $\Omega$                   | R 234      | " " 1/4W 470K $\Omega$      | R 620      | " " 820K $\Omega$           |
| R 121   | " 2.7K $\Omega$                  | R 301      | Resistor 1/4W 3.3K $\Omega$ | R 621      | " " 10 $\Omega$             |
| R 122   | " 10K $\Omega$                   | R 302      | " " 220K $\Omega$           | R 701      | Resistor 1/4W 10K $\Omega$  |
| R 123   | " 22K $\Omega$                   | R 303      | " " 18K $\Omega$            | R 702      | " " 3.3K $\Omega$           |
| R 124   | "                                |            |                             |            |                             |